Basic Program to Control Heat Stress

- Step 1 Assign Responsibilities.
- Step 2 Train Workers and Supervisors
- Step 3 Acclimatize Workers
- Step 4 Look at Conditions and Workers
- Step 5 Manage Work Activities
- Step 6 Establish Drinking Water Program
- Step 7 Additional Measures and 1st Aid

Controlling Heat Stress: (Made Simple)

- Water - Ensure all workers drink enough water to replace water lost thru sweating.
- Acclimatization - Gradually adjust to working in the Heat.
- Rest Breaks - Take periodic breaks in the Shade or in an Air-conditioned area
- Monitor Environmental conditions and workers.

What to Consider

- Weather
- Work Load
- Protective Gear/Clothing
- Age and Physical Condition of Workers
- Acclimatization level of workers

Controlling Heat Stress

- Assign Leaders' Responsibility for Heat Stress problems.
  - Monitor environmental Conditions
  - Set up appropriate work/Rest Cycles
  - Adjust work practices to conditions
  - Ensure workers drink enough water.
  - Treat Heat Stress problems

Workers' responsibilities

- Carry out instructions and training to prevent heat stress.
- Drinking enough water, before, during and after work.
- Report and Respond to Heat Stress problems.
- Personnel Hygiene, get adequate rest, don't use drugs

Responsibilities:

Workers

- Carry out instructions and training to prevent heat stress.
- Drinking enough water, before, during and after work.
- Reporting Heat Stress problems.
- Personnel Hygiene

Leaders

- Monitor Weather conditions
- Make work Assignments
- Adjust work practices
- Ensure workers drink
- Treat heat stress problems
- Conduct safety meetings

2. Train workers and supervisors

- Purpose of Heat Stress program
- What are Heat illnesses
  - Heat Stress and its effects
  - How Heat Stress affects people
- Work/Rest Cycles
- Water Discipline (drink water)
- Acclimatization process

Acclimatize Workers

- When -
  - Sudden increases in:
    - workload
    - temperature
    - humidity
    - protective gear which restricts cooling
    - addition of temporary workers
- Full time workers
  - usually acclimatize as weather warms

Effects of acclimatisation to heat

Increase in:

Work output

Endurance

Plasma volume

Sweat production

Decrease in:

Heart rate

Pulse pressure

Basal oxygen consumption

Sweat electrolyte concentration

Skin/core temperature

Manage Work Activities

- Set up Rest Breaks
- Rotate tasks
- Shift times for doing Heavy work and work requiring protective gear
- Reduce Work Loads
- Postpone non-essential tasks

Establish a Drinking Water Program

- Dehydration has notable effects:
  - reducing skin cooling
  - Strains the circulatory system
    - less blood flow to the skin
    - more body heating
- Fluid Replacement
  - Thirst not a true indicator of fluid needs
    - drink “by the clock”
    - Get a head Start

Fluid Replacement Guidelines for Warm Weather Training
(Applies to average acclimated soldier wearing BDU, Hot Weather)

Heat Category	WBGT Index, °F	Easy Work		Moderate Work		Hard Work	
		Work /Rest	Water Intake, Qt/hr	Work /Rest	Water Intake, Qt/hr	Work /Rest	Water Intake, Qt/hr
1	78-81.9	NL	½	NL	¾	40/20 min	¾
2 (Green)	82-84.9	NL	½	50/10 min	¾	30/30 min	1
3 (Yellow)	85-87.9	NL	¾	40/20 min	¾	30/30 min	1
4 (Red)	88-89.9	NL	¾	30/30 min	¾	20/40 min	1
5 (Black)	> 90	50/10 min	1	20/40 min	1	10/50 min	1

- The work:rest times and fluid replacement volumes will sustain performance and hydration for at least 4 h of work in the specified heat category. Individual water needs will vary ± ¼ qt/hr.
- NL= no limit to work time per hour.
- Rest means minimal physical activity (sitting or standing), accomplished in shade if possible.
- **CAUTION:** Hourly fluid intake should not exceed 1½ quarts.
- Daily fluid intake **should not exceed 12 quarts.**
- Wearing body armor add **5°F** to WBGT Index
- Wearing MOPP overgarment add **10°F** to WBGT Index.

Drinking Water

- Provide sufficient amounts of cool, potable water
- Provide drinking cups or water fountains
- Provide water that meets quality standards
- Place water in locations readily accessible to all workers

Heat Balance

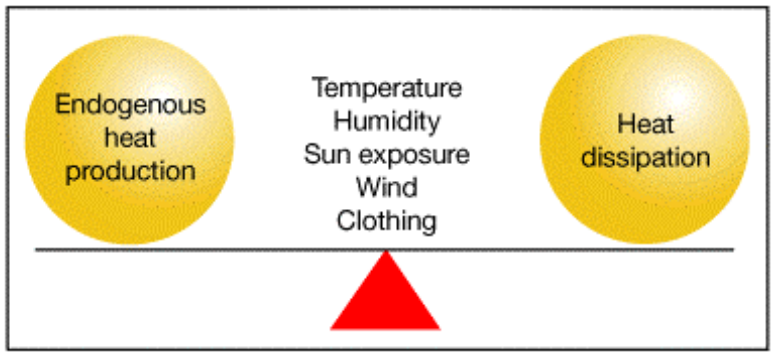
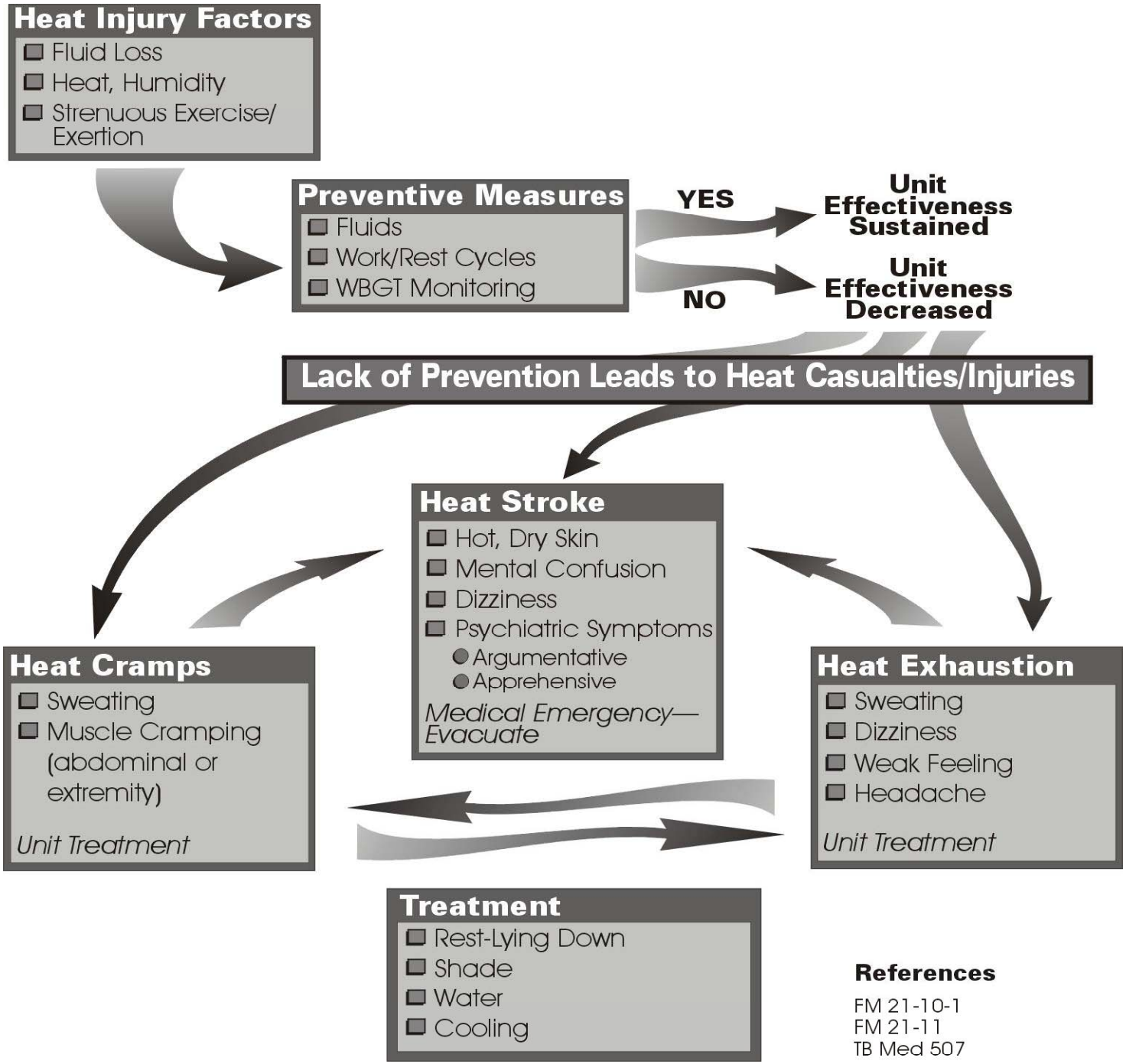


Figure 1. This schematic diagram illustrates heat balance. Heat production is balanced, in most cases, by heat dissipation. The environmental factors in the center can increase or decrease heat dissipation or add to the endogenous heat load.

- Radiation can add up to 300kcal/hour
- Evaporation is No 1 source for cooling



References

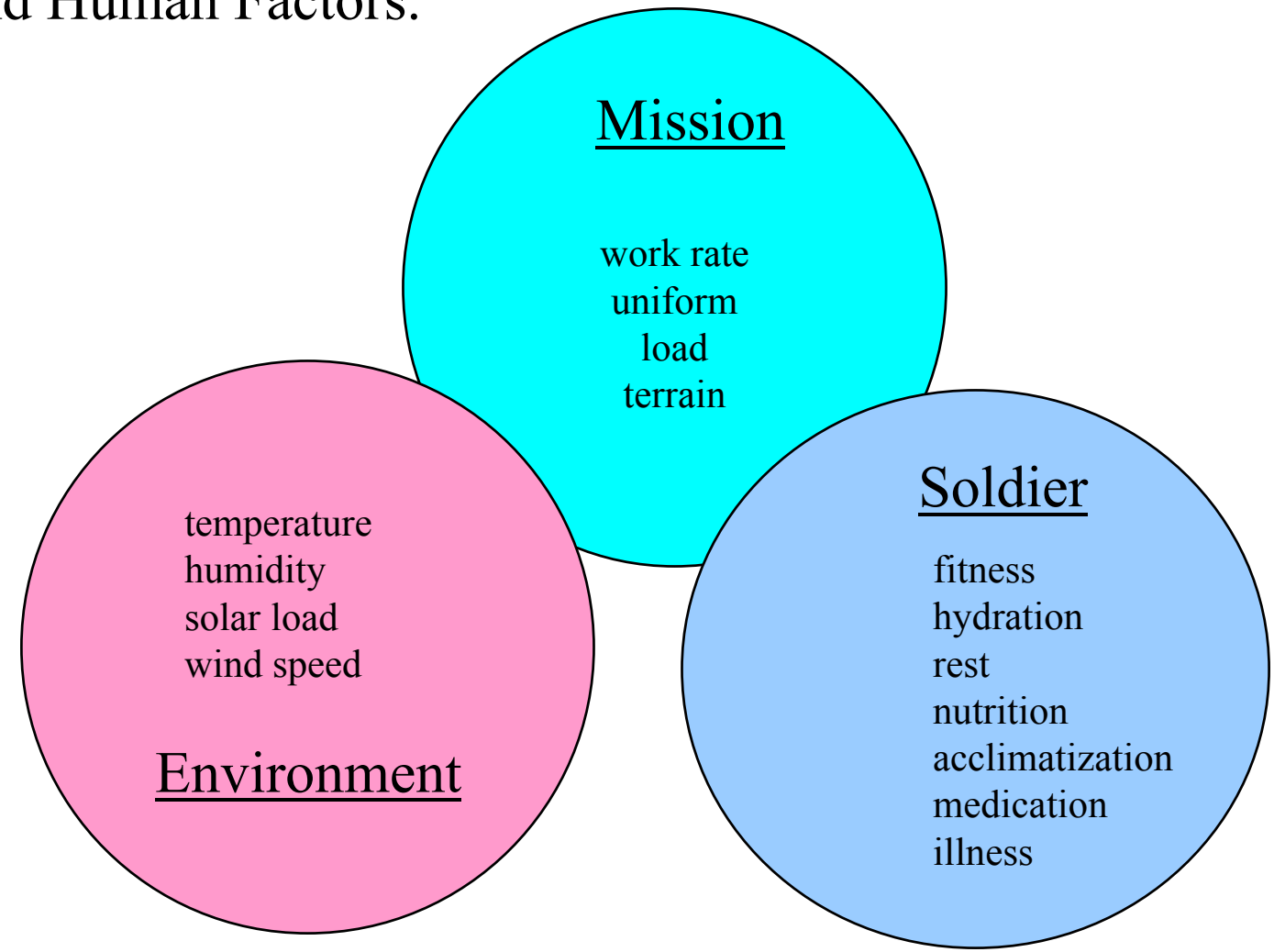
FM 21-10-1
FM 21-11
TB Med 507

Comparison of Heat Exhaustion to Chemical Agent

- HEAT EXHAUSTION
- Sweating
- Headache
- Fatigue
- Dry Membrane
  - Dry mouth
  - No tears
  - No spit present
- FAST pulse (slow if person has fainted)
- Nausea
- DILATED Pupils
- Central nervous system depression
  - Loss of coordination
  - Confusion
  - Fainting (prompt recovery)

- NERVE AGENT
- Sweating
- Headache
- Fatigue
- MOIST Membranes
  - Salivation, Runny nose
  - Tears
  - Spit present in mouth
- Variable pulse
- Nausea and diarrhea
- Possible SMALL pupils
- Central nervous system depression
  - Loss of coordination
  - Confusion
  - Coma (can't waken

Heat Stess is a product of an interaction of Mission, Environmental and Human Factors.



Analysis of Heat injury risk must include all these factors.

MAINTAINING WATER BALANCE

- WATER IS LOST THROUGH
  - URINE
  - BREATHING
  - **SWEATING**
  - STOOLS
- WATER IS RESTORED THROUGH
  - FOOD
  - DRINKS; BEVERAGES (SODA, JUICE, COFFEE)
- EASIEST WAY- DRINK WATER!!

PREVENTING DEHYDRATION

- DO NOT RELY ON THIRST.
- BEFORE ANY EXERCISE OR MISSION, DRINK PLENTY OF FLUIDS.
- BEFORE YOU BEGIN, MAKE SURE YOUR URINE IS CLEAR- THIS IS A SIGN YOU ARE WELL HYDRATED
- DRINK BEFORE, DURING AND AFTER YOUR MISSION